ANNEX 1 – 17 PAGES: OBJECTION-SPECIFIC PAGES OF APPLICANT'S PREVIOUS FILINGS

Original Specification, Fig. 1, Fig. 1B, and pp. 32, 33, 34, 39, 40, 54, 56, 68, 69, 70, 74, 89, 90, 91 and p. 109 of Amendment "A"

d. three main claims and seventeen dependent claims

LIST OF REFERENCE NUMERALS

forestay 18

inner forestay 19

genoa halyard 20

jib halyard 21

semi-elliptical roller-furling convertible genoa-jib 22

vertically deployed semi-elliptical sail 22B

semi elliptical self-tacking jib 23

roller-furling semi-elliptical convertible inner genoa-jib 23A

lower jib batten pocket 24A

lower jib batten pocket 24B

mainsail 25

upper jib battens 25A

upper jib battens 25B

upper jib battens 25C

upper jib batten pocket 26A

upper jib batten pocket 26B

upper jib batten pocket 26C

reef point 27A

reef point 27B

jib downhaul 28

Dutchman control lines 29A, 29B

jib reef line 30

mast 34

backstay 36

jib sheet 37

boom 38

lower round diagonal jib batten 38A

intermediate round diagonal jib batten 38B

integral self-booming battens terminating in fork-end batten boxes

roller-furling forestay mechanism 40

batten-substitute means 41

genoa batten 41A

genoa batten 41B

genoa batten 41C

leech taping 41D

roach stiffening junction 41E

roller-furling inner forestay mechanism 42

strop 43

automatic jib stowage bag 44

automatic stowage bag solar panel 44A

automatic semi-rigid sail stowage bag 45

semi-rigid lower stowage means section 45A

fabric upper stowage means section 45B

automatic mainsail stowage bag 46

genoa sheet 47

genoa batten pockets 49A

genoa batten pockets 49B

genoa batten pockets 49C

main sheet. 50

lower jib batten box 65

lower jib batten box 65A

intermediate jib batten box 66

intermediate jib batten box 66A

supports batten box detail of Amendment A
in conjunction with text at p. 68 of original Specification

central bag section 72

forward bag closure extension 74

aft bag closure extension 76

central bag section stay cutout 77

upper batten pocket 78

upper batten pocket 78A, 78B, 78C, 78D

bag extension batten pockets 79

lower batten pocket 80

lower batten pocket 80A

central bag batten pocket 82

central round batten 83

batten closure flap 85

lower bag batten 86

lower bag batten 86A

upper bag flexible tube 88

upper bag flexible tube 88A

removable fixing means 89

removable fixing means toggle 89A

lower batten flexible tube 90

lower batten flexible tube 90A

attachment point 94

drain hole 95

forward bag lower flexible tube support 96

aft bag lower flexible tube support 98

flaked sail 100

control line 102

control line 102A

clew ring 104

topping lift 106

Dutchman tab 108

Dutchman tab 108A

forward bag lateral support means 110

forward bag lateral support means 110A

forward bag central support means 112

aft bag lateral support means 114

aft bag lateral support means 114A

aft central support means 115

bag upper batten closure means 116

lazy jacks 118

Dutchman control lines 120, 120A

roller-furling cargo boom 124

horizontally deployed semi-elliptical furling mainsail 125

vertically deployed semi-elliptical mainsail 126

headboard end-plate means 126A

upper mainsail sheet 128

reference to all requisite System Sail elements

The said battens may run from the leech to the foot of the sail, as shown in figure 1A, or they may be shorter. In either case, the said battens must be at least long enough and sufficient in number to support the positive roach of the sail in the design wind range of the said sail.

As a general rule this requires a batten at least twice as long as the distance from the triangular demarcation of the sail to the extremity of the leech, each such batten running parallel to the luff of the said sail.

Additional stiffening of the positive roach of the said sail is provided first, by semi rigid leech taping 41D, comprising Mylar ™ or other commercially available material whose physical properties rigidify the leech curve while, at the same time, allowing the said genoa to be furled, or folded for eventual storage.

Second, roach stiffening junctions 41E run between the batten pockets. The said stiffening junctions comprise bands of Mylar ™ or other semi-rigid material having characteristics similar to the said leech taping material.

Annex 1 - 6 of 17

The said sail may employ additional features not shown separately such as leech and foot lines, draft stripes, ultra violet-resistant foot and luff bands, foam or cordage furling aids, telltales, anti chafe protection, and tacking rings.

FIGURE 1B. THE SEMI-ELLIPTICAL SELF-TACKING JIB

Next aft is a semi elliptical self-tacking jib 23, which is constructed using methods and materials described in the immediately preceding paragraph. The said jib is connected at its head to a jib halyard 21, at its clew to a jib sheet 37, and at its tack to the deck by means of a strop 43. The upper battens of the said jib are attached to the inner forestay 19 by conventional hanks, which are not shown, and the two lower battens are attached to the said inner forestay by two fork end batten box terminal supports batten box detail of amendment A

fork-end batten boxes disclosed textually ✓

fittings (not shown).

The lower part of the jib, delimited by the foot of the said jib and intermediate round diagonal jib batten 38B is attached to the inner forestay 19 as follows:

The forward or luff ends of lower round diagonal jib batten 38A and intermediate round diagonal jib batten 38B are contained by lower jib luff batten boxes 65A and 66A respectively. Supports batten box detail of Amendment A ✓

The said jib luff batten boxes incorporate conventional integral threaded tangs, or fork terminals, at their forward ends for attachment to the inner forestay 19. Jib leech batten boxes 65B and 66B contain the aft ends of the said round diagonal intermediate and lower jib battens.

A line drawn from the center of each luff batten box to its companion leech batten box forms a right angle with the luff of the said jib. The batten boxes are attached to the jib by conventional means.

Lower jib batten pockets 24A and 24B contain that portion of the said round lower and intermediate round diagonal jib battens not contained by the said jib batten boxes. Fixed to the said sail are a plurality of upper jib batten pockets attached at right angles to the luff of the said jib, comprising upper jib batten pockets 26A, 26B, and 26C.

Inserted into each of the said upper jib batten pockets is a like number of upper jib battens 25A, 25B, and 25C each of which is retained at its luff and leech end by conventional batten retention means which are not shown. The said upper jib battens are more flexible than the said lower jib battens, and may be either flat or round. The said battens are fixed perpendicular to the luff of the said sail in the preferred embodiment.

A jib reefing line 30 runs from the clew of the said jib through jib reef point 27B to jib reef point 27A, or via pulleys fixed to the said reef points, then down to a deck pulley (not shown), thence to the cockpit.

FIGURES 8A AND 8B, VERTICALLY AND HORIZONTALLY DEPLOYED SEMI-ELLIPTICAL SAILS. ALTERNATIVE EMBODIMENTS

Figures 8A and 8B each depict alternative embodiments of sail system elements described above. Such alternative embodiments may take the form of either headsails or mainsails. Each is shown on a large, three-masted vessel. The construction of the said sails conforms to the respective descriptions found in preceding figures.

Elements of conventional sails including without limitation, leech and foot lines; as well as parts of the present invention, including without limitation, the said batten-substitute means 41, leech taping 41D and roach stiffening junction 41E,and batten end-plate means may be applied to the alternative embodiments depicted in figures 8A and 8B, even if not shown. The particularities of each such embodiment and its operation, as applied to such a vessel is discussed below under "Operation of the Preferred Embodiment."

It should be specifically noted that substitute batten means 41, leech taping means 41D, and roach stiffening junction 41E can comprise not only material attached to a sail by conventional means, but also material applied directly into or onto a sail matrix by a variety of methods or processes, as noted above.

Such methods may be employed for fabrication of particular and unique aspects of the present invention, including, without limitation, substitute batten means 41, leech taping means 41D, and roach stiffening junction 41E.

Conceptual base of System common to all System embodiments

From that point in time, designers concentrated on developing free-standing sails for offwind performance and accepted as dictum that a genoa fixed to a stay was best suited to windward sailing and close reaching. For broad reaching and running, free-standing sails were considered the only real performance choice.

These prejudices ignored the needs of cruising sailors as opposed to racing sailors and the nature of their boats and crews along with the true potential of modern headsail furling gear.

As noted above, by 1925 Manfred Curry had argued that optimum sailing performance depends as much on control of heeling forces as on a sail's surface area. The elliptical distribution of force over a sail has long been accepted as ideal for minimizing heeling forces while obtaining maximum forward drive, or optimum performance. Fully battened semi-elliptical main sails for racing monohulls and for virtually all multihulls appeared, but semi-elliptical in-place headsails did not.

In-place headsails are the predominant headsails on modern sailing craft. Thus, the vast majority of sails used on modern sailboats remain triangular in shape, with the inevitable sacrifices in surface area, efficiency, and ease-of-use.
Research has yielded more efficient three-dimensional headsail plans, lighter and stronger materials, and more resistant assembly methods such as radial and step-up construction. Such improvements would enjoy extreme synergy if they were employed in sails having an efficient semi-elliptical form.

Until now lengthening the foot of triangular in-place headsails has been the only manner of increasing their surface area. The present invention takes an entirely different approach to optimizing in-place headsails.

The present invention simultaneously augments in-place headsail surface area and optimizes in-place headsail efficiency by systematically

B. SEMI-ELLIPTICAL SELF-TACKING JIB

1. SEMI-ELLIPTICAL SELF-TACKING JIB: INSTALLATION

Readying the said semi-elliptical self-tacking jib for navigation begins by inserting upper jib battens 25A, 25B, and 25C into their respective batten pockets, which are then closed using conventional closure means (not shown). The topping lift 106 is attached to the clew ring 104 by a knot or other conventional means, and the patented Dutchman system is attached to the said topping lift and to Dutchman tabs 108 and 108A as detailed in the said Dutchman patent and shown in figure 4A.

Next, with the sail on the deck, insert lower round diagonal jib batten 38A and intermediate round diagonal jib batten 38B through their respective leech batten boxes, 65B and 66B, thence passing through their corresponding batten pockets, 24A and 24B, thence into the their corresponding luff batten boxes 65A and 66A. Typically, threaded plugs are then inserted into the said leech batten boxes to secure the said battens and adjust their tension.

The sail may now be attached to its stay, beginning with lower jib luff batten boxes, 65A and 66A, each of which terminate at its luff end in threaded, forked terminals(not shown). The said forked terminals are placed over the inner forestay 19 and secured by means such as a pin and cotter pin, or a pin with integral toggle (not shown).

The remaining sail to stay attachments comprising conventional headsail hanks (not shown) are then attached to the stay.

With the sail lowered, a conventional jib downhaul 30 is attached to an eyelet just below the head of the sail, thence led to a deck block (not shown), at the foot of the inner forestay and thence to the cockpit.

Supports batten box detail of Amendment A ✓
Enables construction by one skilled in the art ✓

Details of component parts and installation instructions

Next, jib reef line 30 is attached by a knot or other conventional means to the clew ring of the said jib. The said reef line leads through a turning means such as a pulley or eyelet (not shown) at reef point 27B, thence through a similar turning means (not shown) at reef point 25A, thence through a deck block (not shown) at the foot of the inner forestay 19 and aft to the cockpit.

The sail is then hoisted, and the patented Dutchman control lines installed and adjusted to proper length as detailed in the said Dutchman patent and Dutchman owner's manual. At this point the said semi-elliptical self-tacking jib 23 is ready for use.

VERTICALLY DEPLOYED SEMI-ELLIPTICAL SELF-TACKING JIB PERFORMANCE ADVANTAGES

The said vertically deployed semi-elliptical self-tacking jib 23 has a narrower design objective than a multi-purpose roller furling sail, and it is raised and lowered as opposed to being furled and unfurled. The said sail has no need for foam inserts or other furling attachments which compromise performance.

As such, this vertically deployed sail can provide a more constant sail shape than a comparable furling sail and approximately 15% more surface area than a triangular sail with like foot length. The ideal application for the said jib is on boats having a large mainsail and/or multiple headstays, as in **figure 1**.

As the subject sail is hoisted, the forked, threaded jaw terminal of lower jib batten box 65A containing lower round diagonal jib batten 38A is forced against the inner forestay by halyard tension and renders the said sail self-boomed and self-vanged. These are major advantages over a conventional headsail, regardless of whether it is boomed or non-boomed.

supports batten box detail of Amendment A. ✓
enables construction and use by one skilled in the art ✓

exemplary enabling textual disclosure

the wishbones and club jib booms are costly, heavy, and cumbersome, the simple round diagonal battens used in the subject jib are inexpensive, durable, and lightweight, while accomplishing the same tasks as the former devices. This important and comprehensive economy, when combined with the semi-elliptical shape and other properties of the subject sail comprise its uniqueness and its surprising performance and convenience advantages.

Thus, where the conventional sail collapses with wind changes, or as a boat enters the trough of waves, the subject working jib 23 retains its shape and continues to drive the boat. The stability of the said jib 23 is far greater than that of a conventional sail, and changes in wind and sea conditions are absorbed without the violent shocks introduced by the filling and emptying of a conventional sail.

Having covered the advantages of both the horizontally deployed semi-elliptical genoa-jib 22 and the vertically deployed semi-elliptical self-tacking jib 23, it is appropriate to compare the unique merits of each

THE SEMI-ELLIPTICAL FURLING CONVERTIBLE GENOA-JIB 22

v.

THE VERTICALLY DEPLOYED SEMI-ELLIPTICAL SELF-TACKING JIB 23

A semi-elliptical roller-furling convertible genoa-jib 22 can be more versatile than a semi-elliptical self-tacking jib 23, but the absence of self-booming and vanging render the furling sail 23 less stable than the vertically deployed sail 23, which will also have better upwind performance.

Downwind and in erratic wind and wave situations, the self-booming and self-vanging of the latter sail more than compensates for the slight additional effort needed to open and close an automatic stowage bag 44

said boom comprises a boom housing which encloses an opriately sized mainsail roller-furling mechanism. Such a sail enters appropriately sized roller-furling boom without difficulty.

said boom may also serve as a cargo boom once its sail is furled thus providing a multipurpose boom in circumstances where one particularly appropriate. Such a boom provides a large surface, to h solar panels (not shown) can be applied, as well.

semi-elliptical sail, as applied to large vessels, with the boom ditionally serving as a cargo boom and solar cell platform, provides efits in excess of any single element of this particular embodiment.

VERTICALLY DEPLOYED, NON-BATTENED SEMI-ELLIPTICAL HEADSAIL 22B.

envisioned that the evolution of a combination of leech taping 41D each stiffening junctions 4E will eventually provide adequate unity the positive roach of a vertically deployed, semi-elliptical sail to allow elimination of battens. Battens can improve the aerodynamic furling the sail, but this is not a consideration where a vertically deployed or furling sail is concerned.

VERTICALLY AND HORIZONTALLY-DEPLOYED, SEMI-ELLIPTICAL, NON-BATTENED, NON FURLING HEADSAIL 22B ON A LARGER VESSSEL. FIGURE 8A.

Figure 8A depicts a large vessel that carries a vertically deployed, non- ned headsail on its forward most stay, and furling sails forward of its ests and a furling mainsail on the aft mast.

used on larger vessels, it is anticipated that such vertically deployed will generally be non-overlapping, and employ either lazy jacks, as

larger vessel likely to opt for non-overlapping sails. 74
inferentially, smaller vessels will opt for overlapping sails.

89

CLAIMS

Claim Supports all Maxmain embodiments of Amendment A

A sail system comprising a sailing vessel having one or a plurality of masts, one or a plurality of forestays, one or a plurality of main or mizzen sails attached to such masts, and one or a plurality of semi-elliptical sails defined by a luff, a foot, and a leech, including means for attaching each headsail to each forestay, means for attaching each main or mizzen sail to each of the said masts, and means for attaching the clew of each such sail to the vessel, wherein at least one of the said sails is horizontally deployed, is attached to roller furling means, and each such horizontally deployed sail comprises.

a semi-elliptical body, and

means for supporting the positive roach of the said sail and optimizing reefing and furling of the said sail;

Supports all Maxmain and Maxjib embodiments of Amendment A

A sail system comprising a sailing vessel having one or a plurality of masts, one or a plurality of main or mizzen sails attached to such masts, one or a plurality of forestays, and one or a plurality of semi-elliptical sails defined by a luff, a foot, and a leech, including means for attaching each such main or mizzen sail to each such mast, means for attaching each such headsail to each such forestay, and means for attaching the clew of each such sail to the vessel, wherein at least one of the said sails is vertically deployed, such vertically deployed sail comprising:

integral means for booming the said sail and for maintaining leech and vang tension, and

integral means for reefing and controlling the said sail during movement, reefing and recovery maneuvers.

80

Elected claim 2 supporting amended claims 21-23 covering both System Mainsails and Headsails

exemplary enabling Disclosure

c. meansfor supporting the positive roach of the said sail. — examining existing Disclosure

3. A sail system comprising a sailing vessel having one or a plurality of masts, one or a plurality of main or mizzen sails attached to such masts, one or a plurality of forestays, and one or a plurality of semi-elliptical or triangular sails defined by a luff, a foot, and a leech, including means for attaching each such main or mizzen sail to such masts; means for attaching each such headsail to each such forestay, and means for attaching the clew of each of the said sails to the vessel, wherein at least one in-place, automatic closed-end, low-profile sail stowage bag having support means independent of its companion sail stows the said sail and can remain in place during navigation or be removed, as required.

4. The sailing system of claim "1", wherein the said horizontally deployed semi- elliptical headsail is non-overlapping and comprises

a. A flexible, semi-elliptical body comprising a head, a foot, and a clew;

b. one or a plurality of roach support means comprising semi-rigid battens or batten-substitute means;

c. means for attaching the said battens or batten substitute means to the said sail or for incorporating the said batten substitute means onto or into the said sail, such means likewise being situated parallel to the luff of the said headsail;

5. The sailing system of claim "1", wherein the said horizontally deployed semi- positive roach and positive foot dimensions enabling the said sail to be reduced to a non-overlapping working jib having consistently valid sheeting angles throughout the furling range;

a. one or a plurality of roach support means comprising semi rigid battens or batten-substitute means;

b. means for attaching the said battens or batten substitute means to the said sail, such means likewise being situated parallel to the luff of the said headsail;

6. The sailing system of claim "1" wherein the said horizontally deployed, semi-elliptical headsail comprises one or a plurality of means

for supporting the said positive roach throughout the deployment range of the said headsail, such means being incorporated into the material of the said sail during fabrication of the said sail;

7. The sailing system of claim "2.", wherein the said vertically deployed headsail is non-overlapping, and the means for booming the said headsail, whether fully deployed or reefed, comprises one or a plurality of semi-rigid battens or batten substitute means connected at one end, at a right angle to the said headstay, and at the other end, to the clew of the said non-overlapping headsail and contained in batten pockets attached to the body of the said sail;

The sailing system of claim "2.", wherein the said vertically deployed headsail is non-overlapping, and comprises one or a plurality of means for supporting the said positive roach throughout the deployment range of the said vertically deployed headsail, such means either attached to the sail material or applied directly into or onto the said sail material during fabrication.

Specific claim for Overlapping System Headsail

The sailing system of claim "2.", wherein the said vertically deployed headsail is overlapping, and comprises semi-rigid means for supporting the positive roach of the said headsail, such means either attached to the sail material or applied directly into or onto the said sail material during fabrication.

The sailing system of claim "2", wherein the said vertically deployed sail comprises end-plate means, such means being constructed of light reflective or luminescent material.

Specific claims for System elements common to diverse System Sail embodiments

The sailing system of claim "2", wherein the said vertically deployed sail comprises end-plate means, such means being constructed of material capable of reflecting radar waves.

available vertical sail space. System sails do so where conventional sails cannot. In summary, the System reduces to practice meaningful sail power for both recreational and commercial users where triangular sails cannot.

CLAIMS

I claim:

numbering of main claims of Amendment A, beginning with "21"

21. A sail system comprising a mast, a sheet, a sail having a luff edge, a foot edge, a leech edge, a head, a tack, a clew, and means for attaching the head, tack and clew of said sail to a wind-powered vessel, such sail comprising:

A. a maximum foot length no greater than 100% "J";

B. a plurality of sail hanks;

C. a lower diagonal batten having a first end contained by a luff batten box having forestay connect ability attached at or near the luff of said sail at an angle of approximately ninety-degrees to said luff and a second end contained by a leech batten box attached to said sail at or near the clew of said sail, each such batten box being attached to said sail in the axis of said batten;

D. a batten pocket attached to said sail in the axis of said batten;

E. an approximately elliptical positive leech curve descending from the head of said sail through successive leech limit points to the clew of said sail, each such leech limit point deriving as follows :

i. said sail's head-to-clew diagonal being a line from the head to the clew of said sail;

ii. said sail's vertical extremities construction line being a vertical line disposed at or forward of said sail's tack and running upwards from the level of said sail's clew to the level of its head;

iii. said vertical extremities construction line comprising equal segments delimited by horizontal construction lines;